Lewis River Case Study Final Report

A decision-support tool for assessing watershed-scale habitat recovery strategies for ESA-listed salmonids

Appendix L: Models used to coordinate with Ecosystem Diagnosis and Treatment Model (EDT)

May 2007

Introduction

We used the EDT model (Mobrand Biometrics 2004) in two different ways in this analysis. The first use of the EDT model was to generate a restoration strategy based on the reach level restoration and preservation prioritization output from EDT (Table L-1 and Table L-2). The second use of the EDT model was to evaluate the future landscapes. Using EDT to evaluate future landscapes required a translation between restoration actions and EDT input data (Table L-3).

Table L-1. The prioritization system for allocating funds to EDT reaches based on EDT output. 50% of available funds were designated for restoration and 50% for protection. The same reach-level prioritization system was used to allocate funds independently for restoration and for protection.

Basis for Prioritization	Prioritization Notes
EDT model rankings for restoration or protection benefit	Select the reaches with the highest EDT restoration or protection benefit ranking If funds remain after treating all reaches identified as high priority, move to the reaches identified as intermediate priority.
Reach type: Spawning vs. non-spawning reaches. Mainstem vs. tributary reaches	Start with the spawning reaches. If funds remain after all high priority spawning reaches are treated, move to high priority mainstem reaches
Reach location	Within the high priority spawning (or migration) reaches, select the most upstream reach first.

Table L-2. Translation from EDT model output for current conditions within each reach prioritized for restoration or preservation to the EDT watershed management strategy. 50% of the funds were spent on restoration actions. Habitat attributes identified by EDT, by reach, as the most important were "fixed" first. Numbers in each cell represent the prioritization of restoration actions within each row. If two habitat attributes were most limiting, we started with the least expensive problem to fix. All protection funds were spent on riparian protection or restoration. If the current riparian condition was good (as rated by the remotely-sensed riparian model in Table 4 of the main report), riparian conditions were protected; if the current condition was fair or poor, riparian conditions were restored.

EDT Habitat Attribute	Restoration Actions				
	Restore Riparian	Decommission Roads	Remove Barriers	Restore for Spawning	Restore Floodplain[a]
Key Habitat				1	2
Temperature	1				
Sediment Load	2	1			
Obstructions			1		
Habitat Diversity					1
Food	1				
Flow	1	2			
Chemicals	1[b]				
Channel Stability	1	2			

[a] Only areas that historically had floodplains could be treated with floodplain restoration.

[b] If the habitat element was chemicals, riparian areas were only treated if the uplands were currently classified as agricultural or urban land-use.

Table L-3. Model used to translate conservation actions in management strategies into data in a format ready to be used as inputs by the EDT model. All actions were subject to 4 constraints: 1) the proportion of each EDT reach affected by a strategy was equal to the proportion of affected SSHIAP reaches comprising an EDT reach; 2) new EDT scores affected by conservation actions were constrained between patient and template scores and trended toward the template; 3) actions only affected scores if there was a potential for change (i.e., patient - template ≠ 0); and 4) if >1 actions each changed EDT scores, only the largest was registered if effects were in the same direction but the sum of effects was registered if effects of actions had different directions. Abbreviations used are as follows: pΔ = potential for change; p(reach) = proportion of the EDT reach affected; ↑ = improve score. Conditions: [†1] if any part of riparian area was originally urban and at least 50% of the reach is protected/restored; [†2] also improve the next downstream reach in the same way; [†3] if LWD or PFC function improves.

EDT Attribute	Decommission Roads	Protect or Restore Riparian	Restore Floodplain Connectivity	Restore Spawning Habitat
Bed Scour	Scour Depth is estimated directly from the modeled 2.3 year flood flow as Depth = 10*sqrt(flood discharge/bankfull width) (from Emmett and Leopold 1965), then converted to EDT ratings.			
Embeddedness	↑ score by p(reach) where roads are restored * Δ in % covered (as estimated based on road density).	↑ score by p(reach) restored.		New score is the p(reach) restored/protected * pΔ.
Diel Variation in Flow		↑ score by ½ p(reach) where riparian area was urban * pΔ.[†1]		
Fine Sediment Deposited	↑ score by p(reach) where roads are restored * Δ in % fines (as estimated based on road density)* 1.34.			
High Flow	High Flow was calculated as the %Δ in modeled 2.3 year flood flow from historical, and then converted to EDT ratings.			
Large Woody Debris Recruited		New score is the p(reach) restored/protected * pΔ.[†3]		New score is the p(reach) restored/protected * pΔ.[†3]
Miscellaneous Toxic Wastes		↑ score by p(reach) where riparian area was urban * pΔ.[†1]		
Monthly Max Temperature		New score is the p(reach) restored/protected * pΔ.[†2]		

Nutrient Enrichment		↑ score by p(reach) where riparian area was agriculture * pΔ.[†1]		
Channel Confinement resulting from hydrological modifications			New score is the p(reach) restored/protected * pΔ.	
Off-Channel Habitat			↑ score by p(reach) where floodplains were restored * pΔ.	
Riparian Functions		New score is the p(reach) restored/protected * pΔ.	New score is the p(reach) restored/protected * pΔ.	
Small Cobble-Dominated Habitat				New score is the p(reach) where spawning habitat is restored * pΔ.
Turbidity	↑ score by p(reach) where roads are restored * 0.3 * Δ in road density.	↑ score by p(reach) restored * 0.3.		